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CRUISE REPORT¹

VESSEL: *Oscar Elton Sette*, Cruise OES-07-08 (OES-56)

CRUISE PERIOD: September 17–October 3, 2007

AREA OF OPERATION: Papahānaumokuākea Marine National Monument (PMNM)

TYPE OF OPERATION: In support of a Pacific Islands Fisheries Science Center marine debris removal operations

ITINERARY:

Sept 17 Embarked scientists Kyle Koyanagi, Edmund Coccagna, Susan Cooper Alletto, Max Sudnovsky, Kevin O'Brien, Derek Levault, Heather Sandison, Amy Long, Tony Perry III, Jonathan Blodgett, Jubilee Watkins, Frank Mancini, Bonnie DeJoseph, Amy Hall, Russell Moffitt, Leslie Harris, Kaylyn McCoy, and Marie Ferguson. The Marine Debris *Oscar Elton Sette* Cruise 07-08 (OES-56) departed Ford Island, Pearl Harbor at 0900 en route to French Frigate Shoals (FFS). With the cooperation and support of the *Oscar Elton Sette* and other divisions in the Pacific Island Fisheries Science Center (PIFSC), we were able to depart with a full compliment of marine debris divers. Most scientific personnel settled into their staterooms and attended the welcome aboard orientation and were reminded about safety, the ship's standing orders, rules, and regulations. A briefing was held with the boat leaders: Kevin Lino, Marie Ferguson, Amy Hall, and Kyle Koyanagi to run through operational logistics in preparation for our first day in the field. Ship's average speed was 10–11 knots.

Sept 18 En route to French Frigate Shoals at 0830, we successfully conducted the conductivity-temperature-depth (CTD) cast at Nihoa. Later in the morning, scientific personnel held a briefing giving updated information on our ETA for FFS. After the briefing was concluded, gear and boats were prepared for next day's operation. The *Oscar Elton Sette* also conducted fire and abandon ship drills in the afternoon. The Necker CTD cast was successfully conducted at 2330.

¹ PIFSC Cruise Report CR-08-002
Issued 14 March 2008



Sept 19 Arrived French Frigate Shoals (FFS) at 0900 and conducted our daily small boat safety briefing. The first small boats were being pushed over by 0930. All four marine debris boat teams were launched. The marine debris teams removed 308 kg of derelict fishing gear from FFS's shallow coral reef environment. A total of 0.58 km² was surveyed by the marine debris teams, and one accumulation rate site was started. The *Oscar Elton Sette*'s SAFEBOAT was also launched with the invert specialist team onboard to remove the first set of autonomous reef monitoring structures (ARMS). The first set of three ARMS was successfully removed and the samples were sorted, recorded, and preserved for further identification.

Sept 20 A small boat safety briefing was conducted at 0730, and all four marine debris boat teams were launched by 0740. The marine debris teams removed 230 kg of derelict fishing gear from FFS's shallow coral reef environment. Three nets were left behind by the marine debris teams to be further studied the following day by the invert team to sample the derelict fishing gear for invasive species. The debris loads that came in were light; however, the marine debris teams covered 0.96 km² of area and completed the accumulation rate site.

The invert team consisting of Amy Hall (Coral Reef Ecosystem Division (CRED)), Russell Moffitt (CRED), Kaylyn McCoy (DAR), and Leslie Harris (L.A. County Natural History Museum) remained onboard to process samples from the ARMS. The invert team completed sorting one of three sets of the ARMS. The second ARMS were scraped and its samples were later sorted. Derelict fishing gear, recovered from the day's marine debris removal operation, was analyzed and samples were taken by the invert specialist and marine debris staff. Samples from these nets was also sorted and preserved for future analysis to see if any invasive species were present.

Sept 21 A small boat safety briefing was conducted at 0730 and all four marine debris boat teams and the SAFEBOAT carrying the invert specialist were launched by 0740. The marine debris teams removed 741 kg of derelict fishing gear from FFS's shallow coral reef environment. The marine debris teams conducted marine debris surveys and covered 0.85 square km.

The invert team surveyed four nets that were marked the day before by the marine debris teams and carefully sampled these nets while they were still in the water. These in-water surveys produced samples of inverts like sea anemones that were not seen on the debris analyzed on deck due to their fragile size and nature. The derelict fishing gear recovered from today's marine debris removal operation was analyzed on deck, and samples were taken by the invert specialist and marine debris staff. Samples from these nets were sorted, preserved for future analysis, and photographed to see if any invasive species were present.

- Sept 22 A small boat safety briefing was conducted at 0730 and all four marine debris boat teams and the SAFEBOAT carrying the invert specialist were launched by 0740. The marine debris teams removed 1636 kg of derelict fishing gear from FFS's shallow coral reef environment. The marine debris teams conducted marine debris surveys and covered 0.67 km².
- The invert team successfully recovered the second set of ARMS from the lagoon patch reef site and collected, sorted, photographed, and preserved samples.
- Sept 23 A small boat safety briefing was conducted at 0730 and all four marine debris boat teams were launched by 0740. The marine debris teams removed only 68 kg of derelict fishing gear from FFS's shallow coral reef environment. The marine debris team's surveys covered 0.87 km². An accumulation rate site was also completed.
- The invert team remained onboard collecting, sorting, photographing, and preserving samples from the second set of ARMS they collected the previous day.
- Sept 24 A small boat safety briefing was conducted at 0730 and two Avons and the SAFEBOAT were launched by 0740. The invert team remained onboard tediously collecting, sorting, photographing, and preserving samples from the second set of ARMS they collected a few days ago.
- A marine debris team utilized the SAFEBOAT to conduct the removal and instillation of oceanographic equipment scheduled to be installed on this cruise. The SAFEBOAT lost its lower unit gears during the transit and was not operational during the rest of the trip. The oceanographic equipment instillation operation was then conducted off one of the debris Avons. Three divers retrieved a sea surface temperature (SST) buoy and a mooring anchor, replacing it with a new anchor and buoy near Tern Island. The dive team consisted of two working divers with a safety diver in the water and a dive master aboard the small boat that conducted one lift bag operation for the deployment. The anchor was placed on a sand substrate in the same location as the previous anchor at 7.6 m depth. The mooring also had a subsurface temperature recorder (STR) attached. On the second dive, an STR was retrieved and a new one deployed on the anchor of the Coral Reefs Early Warning System (CREWS) buoy near Tern Island. The dive team also observed the integrity and rigging of the CREWS buoy, concluding it to be secure. The anchor rests on sand substrate at 7.9 m depth. During a third dive, an ecological acoustic recorder (EAR) was deployed and the old instrument retrieved by the dive team. The EAR was attached to an existing anchor located meters away from the other two moorings. An STR was also attached to the anchor.

In addition to technical difficulties encountered by the SAFEBOAT, two Avons were not running well as a result of carburetor problems. One boat team stayed on board and worked on the Honda outboards all day and eventually got all Avons fully operational.

Two marine debris teams conducted marine debris surveys for half a day then went to Tern Island to pick up land debris staged there. The water debris removal was light but with the addition of the Tern Island land debris, our total for the day was 1203 kg of derelict fishing gear from FFS's shallow coral reef environment and shorelines. The marine debris team's surveys covered 0.23 km².

- Sept. 25 Four Avons and the Achilles were launched at 0745. The four Avon teams conducted marine debris tow surveys and removal along the inside, reticulated reef towards the northeastern end of the atoll. A total of 602 kg of marine debris were removed. The Achilles team continued invertebrate assessments, in situ, and successfully removed the ARMS located on the southeast site of the atoll.
- Sept. 26 Four Avons were launched at 0745, and all Avon teams conducted marine debris tow surveys and removal along the fringing reef on the northern inside portion of the atoll. One of the northern tow accumulation rate sites was completed. A total of 106 kg of marine debris and derelict fishing gear were removed.
- Sept. 27 Four Avons were launched at 0745, and all Avon teams conducted marine debris surveys. Survey sites were located at the northern section of the atoll, including reef between Tern and Trig Island. One Avon team conducted scuba operations to retrieve a net on the east side of Tern Island which we were unable to recover from the day before. Only one dive was necessary to completely recover the derelict fishing gear. Winds increased to speeds between 20 to 25 knots. Marine debris removal operations were suspended at 1500 because of an increase in wind and weather conditions. A total of 640 kg of marine debris were recovered for the day.
- Sept. 28 Four Avons were launched at 0745, and all Avon teams conducted marine debris surveys along the inside reef at the northern end of the atoll. One tow accumulation rate site was completed, and no derelict fishing gear or debris was recovered from this site. A total of 368 kg derelict fishing gear were removed and recovered for the day.
- Sept. 29 Four Avons were launched at 0745, and all Avon teams conducted marine debris surveys along the inside reef at the northeastern end of the atoll. A total of 688 kg of derelict fishing gear were removed and recovered.
- Sept. 30 Four Avons were launched at 0745. Three Avon teams conducted marine debris surveys, and one Avon team conducted oceanographic operations. The preplanned marine debris survey site was along reef surrounding the Gin Islands at the eastern section of the atoll. Upon initial assessment, we concluded that a portion

eastern section of the atoll. Upon initial assessment, we concluded that a portion of the reef was unworkable because of poor visibility. One Avon team remained at the preplanned site and conducted surveys along reef that was workable while two Avon teams relocated east to the alternate sites along the fringing reef. The alternate debris survey sites were sections of reef at FFS that had not been previously surveyed, and we decided to take advantage of the opportunity and good weather to survey these sites. A total of 56 kg of derelict fishing gear were removed. The fourth Avon team conducted two dives on the southern reefs of FFS.

The dive team conducted two dives on the southern reefs of FFS. The first dive's objective was to retrieve and replace an EAR and STR attached to the same anchor at 23.4 m. On their second dive, two divers replaced an STR at 10.6 m. A free dive operation was also conducted to retrieve and deploy another STR in shallower water (2.1 m).

- Oct. 1 Four Avons and the Achilles were launched at 0745 for the last day of all field operations at FFS. Three Avon teams conducted marine debris surveys along the northeastern reef of the atoll, and one tow accumulation rate site was completed. No derelict fishing gear or debris was recovered from the accumulation rate site. Once marine debris tow surveys were completed, two Avon teams collected land debris from East Island and proceeded to return to the ship. A total of 346 kg of land and marine debris were removed. The fourth Avon team completed oceanographic operations at the southern mooring where one dive was conducted to replace the deepwater EAR and STR on the southern reef of FFS. The Achilles conducted invertebrate surveys and assessments, in situ, on nets recovered by the marine debris removal teams. All planned field operations were successfully completed.
- Oct. 2 Transit day. A scientific personnel meeting was held at 1200 to discuss post-field operation and housekeeping tasks and duties. Operational, field and safety gear were inventoried, repaired, and prepped for the return transit to Honolulu.
- Oct. 3 Arrived at Pearl Harbor, Honolulu, at 1800. Disembarked all scientists: Kyle Koyanagi, Kevin Lino, Noah Pomeroy, Edmund Coccagna, Susan Cooper Aletto, Amy Hall, Bonnie DeJoseph, Marie Ferguson, Frank Mancini, Max Sudnovsky, Kevin O'Brien, Derek LeVault, Heather Sandison, Amy Long, Jonathan Blodgett, Jubilee Felsing-Watkins, Tony, Perry, Kaylyn McCoy, and Leslie Harris.

MISSIONS AND RESULTS:

- A. Conduct a maintenance level marine debris operation to remove derelict fishing gear in shallow water coral reef environments.

During the OES-07-08 cruise, all marine debris objectives were met. All high density debris sites at FFS were resurveyed and cleared of derelict fishing gear in waters less than 10 m. A total of 6,992 kg of derelict fishing gear were removed from FFS's shallow coral reef environment and shorelines.

Location	Land/Water Debris	Weight (kg)
French Frigate Shoals	Water debris	5,868
French Frigate Shoals	Land debris	1,124
Total	Water and land debris	6,992

- B. Resurvey accumulation rate study sites.

With the exception of one accumulation rate site which was not surveyable due to unfavorable conditions, the remainder of the tow accumulation rate sites at FFS were surveyed and cleared of derelict fishing gear in waters less than 10 m.

- C. Remove previously collected debris onshore at various locations throughout the Northwestern Hawaiian Islands National Monument in collaboration with the PIFSC, Protected Species Division, and U.S. Fish and Wildlife Service. Land debris removal efforts at FFS were conducted successfully. The total weight of derelict fishing gear removed from FFS's shoreline was 1442 kg.
- D. Survey and sample derelict fishing gear found for invasive species. Remove ARMS and collect, document, and preserve algae and invertebrate samples.

Invertebrate and Algae Samples Collected:

Samples collected from ARMS	3578
Samples collected from Marine Debris	1516
Total	5094

- E. Remove and replace oceanographic equipment of EARs, STR, and CREWS buoy at FFS.

The Marine Debris Team was able to safely and successfully deploy and retrieve the planned oceanographic instruments at FFS during the OES-07-08 cruise. Three NOAA working divers and three NOAA certified scientific divers with specialized task endorsements (STE) conducted scuba dives and one snorkel dive during the cruise. All dives were conducted on open circuit scuba with compressed air and performed with dive computers but operated under all NOAA Dive Centers with no chamber protocols including the minimum 3-minute safety stop.

Instrument type	Action taken	Date	Latitude			Longitude			Water depth	
		MM/DD/YY	Deg	Min	N/S	Deg	Min	EW	(m)	(ft)
SST	Deployment	9/24/07	23	51.37490	N	166	16.50310	W	7.62	25
SST	Retrieval		23	51.37490	N	166	16.50310	W	7.62	25
STR	Deployment		23	51.37490	N	166	16.50310	W	7.62	25
EAR	Deployment	9/24/07	23	51.39140	N	166	16.29250	W	6.10	20
EAR	Retrieval		23	51.39140	N	166	16.29250	W	6.10	20
STR	Deployment		23	51.39140	N	166	16.29250	W	6.10	20
STR	Deployment	9/24/07	23	51.40560	N	166	16.31200	W	7.92	26
STR	Retrieval		23	51.40560	N	166	16.31200	W	7.92	26
STR	Deployment	9/30/07	23	38.32980	N	166	10.78010	W	10.67	35
STR	Retrieval		23	38.32980	N	166	10.78010	W	10.67	35
STR	Deployment	9/30/07	23	38.70980	N	166	10.42620	W	2.13	7
STR	Retrieval		23	38.70980	N	166	10.42620	W	2.13	7
EAR	Deployment	10/01/07	23	38.10440	N	166	11.13220	W	23.47	77
EAR	Retrieval		23	38.10440	N	166	11.13220	W	23.47	77
STR	Deployment		23	38.10440	N	166	11.13220	W	23.47	77
STR	Retrieval		23	38.10440	N	166	11.13220	W	23.47	77

- F. Conduct CTDs cast opportunistically at permanent CTD cast locations listed in cruise instructions and night CTD casts at various locations around FFS.

Date	Latitude	Longitude	Station	Notes
9/18/2007	N 22° 32.146	W 162° 0.254	Nihoa	Successful
9/18/2007	N 23° 11.332	W 164° 42.787	Necker	Successful
9/21/2007	N 23° 34.237	W 166° 17.717	French Frigate Shoals	Successful

- G. Conduct pearl oyster and crown-of-thorn starfish surveys.

A total of 9.1271 km² of area were surveyed at FFS in waters less than 10 m. Despite the large area, there was no recorded crown-of-thorns starfish sighting within our surveyed sites; therefore, no crown-of-thorn samples were collected. Within the same survey area, 48 pearl oyster waypoints were taken.


**SCIENTIFIC
PERSONNEL:**

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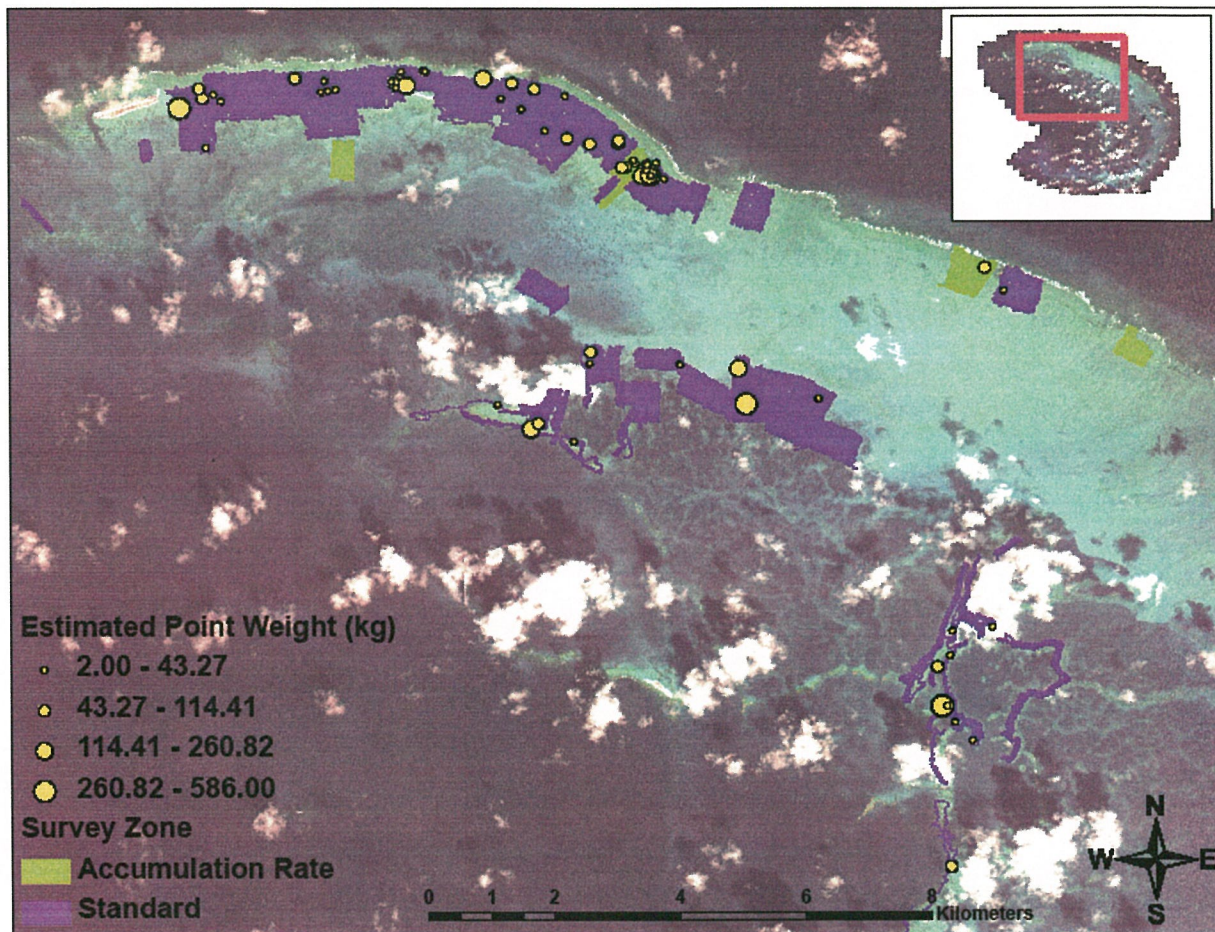


Figure 1.--French Frigate Shoals marine debris survey sites.

